SYNOPSIS OF P.G. RESEARCH PROBLEM

ON

VARIETAL EVALUATION OF GLADIOLUS IN SAURASHTRA REGION

UNDER THE GUIDANCE OF

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SYNOPSIS OF RESEARCH PROJECT

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9. Introduction

Floriculture is emerging as a profitable venture due to divergence of farmers towards high value floral crops and utilization of flowers in social and industrial level. The floral industry is one of the major industries in many developing and under developed countries (Islam *et al.*, 2017). Flowers, beyond their aesthetic appeal, possess immense ecological, cultural and economic significance, particularly in the context of ornamental horticulture. Ecologically, they play a crucial role in attracting pollinators and maintaining biodiversity, thereby supporting sustainable ecosystems. Culturally, flowers are deeply embedded in traditions, religious practices and social ceremonies, symbolizing a wide range of human emotions and values. From a scientific perspective, their diverse morphological and reproductive adaptations contribute to plant improvement and breeding programs. Economically, flowers form the backbone of the floriculture industry, generating employment and income through activities such as cut flower production, landscaping and nursery management. In regions like Saurashtra, the cultivation of ornamental crops such as gladiolus offers significant potential for income generation and diversification of agriculture. Therefore, understanding the multifaceted importance of flowers not only enhances

appreciation for their role in nature but also highlights the need for their sustainable cultivation and conservation.

Gladiolus (*Gladiolus grandiflorus* L.) is an important bulbous ornamental crop widely cultivated for the cut flower trade in India. It is highly appreciated for its attractive, elegant and multicoloured spikes, which make it suitable for floral arrangements, bouquets, interior decoration and garden display (Sharma *et al.,* 2017). Gladiolus is one of the largest genera of the family Iridaceae, comprising about 265 species and is native to South Africa, with wide distribution in tropical and subtropical regions of the world. It is considered an important group among ornamental bulbous cut flowers (Singh *et al.,* 2018). It is commonly known as sword lily or corn lily and is often called the "queen of bulbous flowers" because of its attractive appearance and commercial value (Azimi, 2020). In the international cut-flower trade, gladiolus ranks fourth and comes after rose, chrysanthemum and carnation (Kamble, 2001). In recent years, greater emphasis in gladiolus improvement has been given to the development of varieties possessing desirable traits such as longer spikes, a higher number of well-spaced large florets, attractive colours and better corm multiplication ability (Sharma *et al.,* 2017). These characteristics are essential for enhancing its market value and suitability for both domestic use and export purposes. The luxuriance unique multicolored spikes of some high demanding gladiolus cultivars have great economic value for cut flower trade and much valued by the aesthetic world for beauty and loving people because its prettiness and unparallel elegance (Anwar, 2018). Multiplication of planting material of gladiolus is very important, as the cut flower trade has been lagging in recent years due to the non-availability of adequate quality planting material on a large scale (Swaroop *et al.,* 2019).

According to Des Raj (2006), nearly 3500 ha area in India is occupied by bulbous ornamentals, with the maximum area (1200 ha) under gladiolus. In India, gladiolus is mainly cultivated in states such as Uttar Pradesh, Uttarakhand, Karnataka, Punjab, West Bengal, Assam, Sikkim, Himachal Pradesh, Haryana, Delhi and Meghalaya (Singh *et al.,* 2016). India has diverse climatic conditions in different regions, which provide the possibility of cultivating gladiolus throughout the year in one or another part of the country. Most of the cultivars have been introduced from countries such as U.S.A., Holland, U.K., Canada, Russia, Australia, Poland, Japan, New Zealand and France. However, in the early stages, American-breed gladiolus was widely popular across the world (Swaroop, 2010). Gladiolus is very amusing in varietal properties and every year there is an accretion of new cultivars. Development of cultivars with higher yield

and improved quality has been the main objective of most breeding programmes (Anwar *et al.*, 2018). Due to the increasing market demand for cut flowers, driven by improving socio-economic status, changing lifestyles and a growing preference for novelty and aesthetic appeal, many new varieties are being introduced each year. This rapid diversification requires systematic evaluation of existing cultivars to assess their performance and to identify desirable traits such as spike quality, yield and adaptability. Such studies are essential for selecting superior cultivars that meet market demands and perform well under specific agro-climatic conditions, thereby improving productivity and profitability in floriculture. The performance of any crop or variety largely depends on its genetic makeup as well as the prevailing climatic conditions of the region where it is grown. Therefore, cultivars that perform well in one region may not show the same performance under different agro-climatic conditions. This variation requires the systematic collection and evaluation of available genotypes to identify those best suited for specific regions. Such evaluation aids in selecting high-yielding, adaptable and stable cultivars, ultimately contributing to enhanced productivity and profitability. Genetic variability or divergence within a population is essential for the selection of suitable parents in hybridization programmes. It assists in the development of improved cultivars with better adaptability to changing climatic conditions.

10. Practical Utility of the Research Project:

Gladiolus (*Gladiolus grandiflorus* L.) is an important bulbous ornamental crop widely grown as a cut flower and is highly valued in the industry for its attractive spikes, wide range of colours and excellent vase life. It ranks among the leading commercial cut flowers in India and is extensively used for floral arrangements, bouquets, exhibition purposes and landscaping. In regions like Saurashtra, the selection of suitable cultivars is essential to achieve better growth, yield and quality of spikes. Gladiolus has good market demand due to its suitability for both domestic use and export, along with its potential for corm and cormlet production. The crop has adaptability to different agro-climatic conditions, but performance varies significantly among cultivars. Therefore, evaluation of different gladiolus varieties under Saurashtra conditions is necessary to identify the most suitable and high-performing cultivars. The findings of such studies will help farmers adopt better varieties, enhance productivity and obtain higher economic returns. Keeping these aspects in view, the present investigation on **"Varietal evaluation of gladiolus in Saurashtra region"** is proposed.

11. Objectives:

1. To evaluate the performance of different gladiolus cultivars for growth and spike yield.
2. To evaluate the quality parameters of different varieties of gladiolus grown in Saurashtra region.
3. To study the yield and yield attributes of corms.

12. Review of Literature:

The gladiolus varieties White Prosperity, Rose Supreme, Priscilla, Oscar, Applause, Turkana, Wind Song and Her Majesty were reported as most promising for plant height under the conditions of Romania and France (Cantor *et al.*, 2000).

Roy and Sharma (2000) reported that the longest spike (98.2 cm) was obtained in Jester, followed by White Prosperity (89.8 cm).

Rao *et al.* (2000) observed that Hybrid No. 18-6-13 produced shorter and thinner spikes compared to Hybrid No. 85-1-13, while the latter produced strong and longer spikes (96.00 cm).

Kumar and Yadav (2005) also found Dhanvantari superior with respect to plant height (115.83 cm) and leaf length (60 cm) under Umiam (Meghalaya) conditions.

Ram *et al.* (2005), under sodic soil conditions of Lucknow, recorded minimum days (18.32) for complete sprouting in Nova Lux, whereas maximum days (24.89) were observed in Jester Gold.

Swaroop *et al.* (2005) reported that gladiolus varieties Dhanvantari, Anjali, Chandani, Gold Dust, Hunting Song and African Star performed better than others for different parameters of vegetative growth, flowering and corm production under Delhi conditions. The variety Dhanvantari was categorized as special grade based on spike length, while Gold Dust and Sunayana were placed under standard grade, and the remaining varieties were grouped as utility grade.

Swain *et al.* (2008) evaluated the performance of 12 gladiolus varieties under Koraput (Orissa) conditions and observed 100 per cent corm sprouting in American Beauty, Congo Seal, Charmin Flower, Eight Wonder and Jubily, whereas only 80 per cent sprouting was recorded in White Prosperity.

A study conducted by Mushtaq (2013) at Pir Mehr Ali Shah Arid Agriculture University evaluated four exotic gladiolus cultivars under rainfed conditions to assess their growth and floral performance. The results revealed significant variation among cultivars for both vegetative and floral traits. ‘Pietmohlen’ performed better in terms of leaf length, leaf area, earliness in blooming,

number of florets per plant and floret length, indicating its superiority in overall growth and flowering. ‘Florared’ showed better performance for number of leaves per plant and vase life, suggesting its suitability for cut flower quality. Both ‘Pietmohlen’ and ‘Florared’ outperformed ‘Fado’ and ‘Madriver’ in most of the parameters. The study concluded that these cultivars are promising and can be recommended for cultivation under similar agro-climatic conditions.

A study on Gladiolus cultivars emphasized the importance of assessing variability and genetic relationships for effective crop improvement. A total of 50 cultivars were evaluated using morphological, physiological, and molecular (DAMD) markers to determine genetic diversity. Cluster analysis through UPGMA grouped the cultivars into different clusters based on various datasets, which was further supported by principal coordinate analysis. The results revealed considerable variation among cultivars at phenotypic and physiological levels, attributed to genetic and environmental factors. Molecular analysis showed a high level of polymorphism, indicating substantial genetic diversity within the material. Significant positive correlations were observed among key traits such as plant height, spike length, and number of florets per spike, suggesting their interdependence in determining floral quality. Physiological traits like chlorophyll content also showed strong association with electron transport rate, reflecting plant vigor. The study concluded that the presence of high genetic variability and divergence among cultivars provides a valuable resource for selecting superior parents in gladiolus breeding programs (Singh *et al.,* 2016).

A field experiment conducted at Bangladesh Agricultural Research Institute evaluated four gladiolus cultivars to assess their adaptability and performance under the Tista Meander Floodplain Agro-Ecological Zone. The study revealed significant variation among cultivars in terms of vegetative, floral, and economic traits across two consecutive years. ‘BARI Gladiolus-5’ showed superior spike production in the first year, while ‘BARI Gladiolus-4’ performed best in the second year. However, ‘BARI Gladiolus-4’ consistently exhibited higher market value, better spike length, and longer attractiveness, indicating its commercial potential. Economic analysis also supported these findings, with maximum gross return and gross margin recorded in ‘BARI Gladiolus-4’ during 2015-2016 and in ‘BARI Gladiolus-5’ during 2016-2017. In contrast, ‘BARI Gladiolus-1’ showed the lowest economic returns in both years. Overall, the study suggested that ‘BARI Gladiolus-4’ and ‘BARI Gladiolus-5’ are most suitable for commercial cultivation under the given agro-ecological conditions (Islam *et al.,* 2017).

A study conducted at Sardar Vallabhbhai Patel University of Agriculture and Technology evaluated 53 gladiolus genotypes during the Rabi season to assess genetic variability using Mahalanobis D^2 analysis. The genotypes were grouped into eight distinct clusters, indicating substantial genetic diversity among the varieties. Cluster IV contained the maximum number of genotypes, while the highest intra-cluster distance was observed in cluster VII, suggesting greater variability within this group. The maximum inter-cluster distance was recorded between clusters VII and VIII, indicating a high degree of genetic divergence between them. The results also showed no direct relationship between genetic diversity and geographical origin of the genotypes. Cluster VII exhibited higher mean values for number of corms per plant, whereas cluster VIII showed superior performance in terms of corm weight and total corm yield. The study suggested that hybridization between genetically distant clusters, particularly VII and VIII, could be effective for improving corm yield and developing superior gladiolus varieties (Sharma *et al.,* 2017).

A study conducted in Pakistan evaluated the performance of seven exotic gladiolus cultivars under agro-climatic conditions of Rawalpindi using a randomized complete block design. The results revealed significant variation among cultivars for growth and floral parameters. 'Porterdale' exhibited superior vegetative growth, including maximum plant height, number of leaves, leaf length and leaf area, along with better floret length. In contrast, 'Fado' performed best in floral attributes such as spike length, floret width and number of florets per plant, indicating its suitability for cut flower quality. Early flowering was observed in 'Invi', while 'Invi' and 'Nova' recorded maximum floret longevity. The study highlighted the importance of genotype selection based on specific traits for commercial cultivation. Based on overall performance, 'Porterdale' and 'Fado' were identified as the most suitable cultivars for cut flower production under the given conditions (Anwar, 2018).

A study conducted by Azimi (2020) in Iran evaluated five cultivars of gladiolus (*Gladiolus grandiflorus*) under a randomized block design to identify superior genotypes for growth and yield performance. The results indicated significant variation among cultivars for both vegetative and reproductive traits. 'Oscar' exhibited superior vegetative growth, including maximum plant height, spike length, number of florets and vase life, suggesting its suitability for cut flower quality. In contrast, 'Red Advance' performed best in yield-related parameters such as corm weight and number of cormlets, indicating higher propagation potential. High heritability estimates were recorded for key traits plant height, spike length and number of florets, implying strong genetic

control. Positive and significant correlations were observed between corm and cormlet yield attributes, particularly with number and diameter of cormlets. The findings highlight 'Red Advance' as a promising cultivar for commercial cultivation due to its higher yield and propagation efficiency, while 'Oscar' remains suitable for superior floral quality.

13. Materials and Methods:

13.1 Location:

Instructional Farm (Jambuvadi), College of Horticulture, Junagadh Agricultural University, Junagadh

13.2 Year and season of experiment:

Rabi season: 2026-27 and 2027-2028

13.3 Experimental design:

Randomised Block Design (RBD)

Experimental details:

1.	Plot size	Gross plot: 2.00 × 1.00 m^2 Net plot: 1.20 × 0.60 m^2
2.	No. of treatments	12
3.	No. of replications	3
4.	Spacing	40 × 20 cm
5.	No. of plants/ treatment/ replication	25
6.	No. of plants per net plot	9

13.4 Treatment details:

V_1	**:**	Punjab Gold (yellow)
V_2	**:**	Pusa Dhanvantari (pink/ red shade)
V_3	**:**	Punjab Dawn (white with red throat)
V_4	**:**	Pusa Kiran (deep orange red)
V_5	**:**	Pusa Gunjan (pink)
V_6	**:**	Praha (red/ deep pink)
V_7	**:**	Pusa Urmi (pink)
V_8	**:**	Pusa Sweta (white)

V_9	**:**	Pusa Archana (pink)
V_{10}	**:**	Arka Naveen (red)
V_{11}	**:**	Arka Amar (red)
V_{12}	**:**	Arka Kesar (light yellow with red tinge)

13.5 Observations to be recorded:

13.5.1 Vegetative Parameters

1. Days to sprouting of corms
2. Plant height (cm)
3. Leaf length (cm)
4. Leaf width (cm)

13.5.2 Flowering Parameters

1. Days to emergence of spike (slipping stage)
2. Spike length (cm)
3. Spike diameter (cm)
4. Floret-neck diameter (cm)
5. Floret diameter (cm)
6. Rachis length (cm)
7. Duration of flowering (days)
8. Number of florets per spike

13.5.3 Yield Parameters

1. Number of spikes produced per plant
2. Number of spikes produced per plot
3. Number of spikes produced per hectare

13.5.4 Corm Characters

1. Diameter of daughter corms (cm)
2. Weight of daughter corms (g)

13.5.5 Vase-life

1. Vase-life of spike (days)

14. Statistical Analysis

Statistical analysis of data of various characters will be carried out as per Randomized block design (RBD) and any necessary design required for laboratory trial. Analysis of variance will be worked out using standard statistical procedures as described by Panse and Sukhatme (1985). The statistical analysis will be carried out in Department of Agricultural Statistics, College of Agriculture, J.A.U., Junagadh.

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Signature of Student **Signature of Major Guide**

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CERTIFICATE

This is to certify that **Ms. GOHEL KRUPABEN VITTHALBHAI (Reg. No. 1020625001)** has made an oral presentation of the thesis synopsis in College of Horticulture, J.A.U., Junagadh dated on 10/04/2026 in the presence of advisory committee members, others faculty members and P.G. students. The student has incorporated all the suggestions.

Signature of major guide and the members of the advisory committee

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